36. $\frac{dP}{dt} = k(M-P)$ limited growth

a) show $P = M - Ae^{-kt}$

sep. var. $\frac{dP}{M-P} = k\,dt$

integrate $\int \frac{dP}{M-P} = \int k\,dt$

solve for P $-\ln|M-P| = kt + c$

$\ln|M-P| = -kt + c$

$e^{\ln|M-P|} = e^{-kt+c}$

$|M-P| = e^{-kt} \cdot e^{c}$

if $P < M$

$M-P = Ae^{-kt}$

$M - Ae^{-kt} = P$

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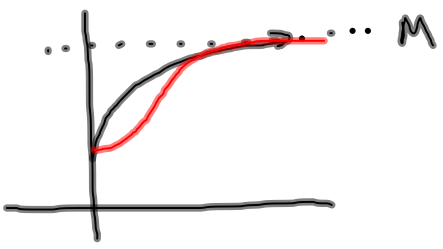
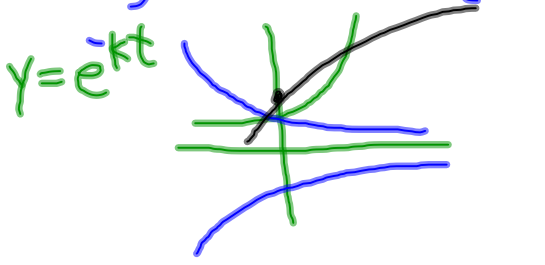
b) $\lim_{t\to\infty} P(t) = \lim_{t\to\infty} M - Ae^{-kt} = M$

c) growing fastest: $\frac{dP}{dt}$ biggest

$\frac{dP}{dt} = k(M-P)$

biggest smallest at $t=0$

d) 



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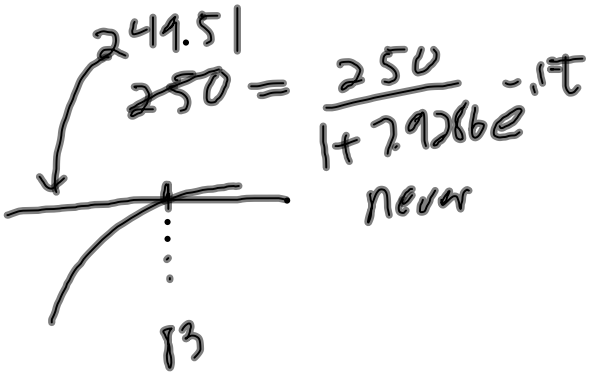
34. $\frac{dP}{dt} = .0004\,P(250-P) \qquad P_0 = 28$

$P = \frac{M}{1+Ae^{-kMt}} = \frac{250}{1+7.9286e^{-.1t}}$

$A = \frac{M-P_0}{P_0}$

$A = \frac{250-28}{28}$

$A = 7.9286$



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